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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/627,238	07/24/2003	Claus-Rupert Hohenthanner	13430 US	4183

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EXAMINER

LEWIS, BEN

ART UNIT	PAPER NUMBER
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1745

DATE MAILED: 07/13/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/627,238

Applicant(s)

HOHENTHANNER ET AL.

Examiner

Ben Lewis

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) 9-19 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 2/18/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C.

121:

I. Claims 1-8, drawn to a process for applying a catalyst ink onto a substrate, classified in class 429, subclass 137.

II. Claims 9-19, drawn to a device for the application of catalyst inks, classified in class 427, subclass 471.

2. Inventions I and II are related as process and apparatus for its practice.

The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case as admitted in the subject matter of the present claims the apparatus as claimed in Group II can be used to practice another and materially different process which does not require a drying step.

3. During a telephone conversation with Mr. Scott Locke. On June 7th, 2006, a provisional election was made without traverse to prosecute the invention of Invention I species I, claims 1-8. Affirmation of this election must be made by

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applicant in replying to this office action. Claims 9-19 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claim 1 is rejected under 35 U.S.C. 102(e) as being anticipated by Starz et al. (U.S. Patent No. 6,500,217).

With respect to claims 1,4 and 5, Starz et al disclose a process for applying electrode layers to a polymer electrolyte membrane strip for fuel cells wherein the above and other objects of the invention can be achieved by a process for applying electrode layers on to a polymer electrolyte membrane strip “substrate” in a desired pattern, wherein the front and back of the membrane are continuously printed with the electrode layers in the desired pattern using an ink containing an electrocatalyst and the printed electrode layers are dried at

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elevated temperature immediately after the printing operation, the printing taking place while maintaining accurate positioning of the patterns of the electrode layers on the front and back in relation to one another (Col 2 lines 54-64).

Starz et al also teach that to produce membrane-electrode assemblies, an ink with the following composition was used:

Ink: Catalyst 20% Pt 15.3 g on Vulcan XC72 NAFION Polymer 5.1 g

Tetrabutylammonium hydroxide 2.0g Li_2CO_3 5.5g Glycerol 127.7g Alcohol, water 44.6g

Regarding the controlling of humidity and temperature, Starz et al. teach that to improve the accuracy of print positioning on front and back still further, the water content of the membrane can be kept within certain limits. Controlling the water contents of the membrane during the printing process enables the shrinkage and expansion properties of the membrane to be controlled and thus increases the accuracy of print positioning on front and back. The maximum water absorption capacity of a polymer electrolyte membrane based on perfluorinated sulfonic acid is a water content of about 30 wt. %. For the process according to the invention, water contents of 2 to 20, especially 10 to 20 wt. %, have proved suitable. Higher water contents lead to excessive expansion of the membrane associated with crack formation and reduced adhesion of the electrode layers. Alternatively, there is the possibility of adjusting the water content of the membrane by treating it in a humid atmosphere with 50 to 100% relative humidity and at 40 to 90 °C (Col 4 lines 30-67).

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Regarding drying the catalyst-coated substrate at an elevated temperature, Starz et al teach that during the actual printing operation the polymer membrane is held, printed and then moved on by the repeat distance of the coating pattern. This operation is repeated until the entire polymer membrane is coated. The printed electrodes are dried by means of the continuous drier 12 a drying temperature of between 60 and 150 °C being selected. Hot-air or infrared driers which gently remove the solvents from the coating are preferably used. The drying time needed is regulated by the speed of the polymer strip (Col 6 lines 25-40).

With respect to claims 2 and 3, Starz et al teach that to produce membrane-electrode assemblies, an ink with the following composition was used:

Ink: Catalyst 20% Pt 15.3 g on Vulcan XC72 NAFION Polymer 5.1 g
Tetrabutylammonium hydroxide 2.0g Li₂ CO₃ 5.5g Glycerol "surfactant" 127.7g
Alcohol, water 44.6g (Col 7 lines 30-45).

With respect to claim 6, Starz et al teach that controlling the water contents of the membrane during the printing process enables the shrinkage and expansion properties of the membrane to be controlled and thus increases the accuracy of print positioning on front and back. The maximum water absorption capacity of a polymer electrolyte membrane based on perfluorinated sulfonic acid

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is a water content of about 30 wt. %. For the process according to the invention, water contents of 2 to 20, especially 10 to 20 wt. %, have proved suitable. Higher water contents lead to excessive expansion of the membrane associated with crack formation and reduced adhesion of the electrode layers. Alternatively, there is the possibility of adjusting the water content of the membrane by treating it in a humid atmosphere with 50 to 100% relative humidity and at 40 to 90 °C (Col 4 lines 30-67).

With respect to claims 7 and 8, Starz et al teach that the preferred temperatures for drying the layers are between 60 and 150°C. The residence time of the polymer membrane in the drying station must guarantee adequate drying of the electrode layers. It depends on the temperature selected and can be prolonged by appropriate deflections in the drying station (Col 3 lines 5-19).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ben Lewis whose telephone number is 571-272-6481. The examiner can normally be reached on 8:30am - 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax

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phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Ben Lewis

Patent Examiner
Art Unit 1745



PATRICK JOSEPH RYAN
SUPERVISORY PATENT EXAMINER